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This bulletin, the fifth in a series, includes brief descriptions of research projects approved by the Cooperative Research Program of the Office of Education during fiscal year 1961. Each description contains a statement of the problem under investigation, the objectives of the project, and the procedures used to carry out the research. Also reports name(s) and title(s) of investigator(s), contracting institution, duration of project, starting and completion dates, and assigned project number.							
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Office of Education

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Cooperative Research Projects

Fiscal 1961

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • Office of Education

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OE-12004-61
Bulletin 1962, No. 18

Cooperative Research Projects

Fiscal 1961

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Anthony J. Celebrezze, *Secretary*

Office of Education
Sterling M. McMurrin, *Commissioner*

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FOREWORD

THIS BULLETIN, the fifth in a series, includes brief descriptions of research projects approved by the Cooperative Research Program of the Office of Education during fiscal year 1961. Most of the projects were negotiated into contract in fiscal year 1961; however, some were contracted in fiscal year 1962. Each description contains a statement of the problem under investigation, the objectives of the project, and the procedures used to carry out the research. The name(s) and title(s) of the investigator(s), the contracting institution, the duration of the project, the starting and completion dates, and the assigned project number are also included.

Additional information about current projects may be obtained directly from the individuals conducting the research. The sources of information about completed projects are described in detail in the introduction.

RALPH C. M. FLYNT, *Associate Commissioner,
Bureau of Educational Research and Development*

FRANCIS A. J. IANNI, *Acting Director,
Cooperative Research Branch*

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INTRODUCTION

IN FISCAL YEAR 1961 the Cooperative Research Program entered its fifth year of operation. This program of the Office of Education was established in 1954 under Public Law 531, 83d Congress, which authorized the U.S. Commissioner of Education "... to enter into contracts or jointly financed cooperative arrangements with universities and colleges and State educational agencies for the conduct of research, surveys, and demonstrations in the field of education."

Under this authority, the Cooperative Research Program has given extensive financial support to basic and applied research projects related to education at all levels. In fiscal year 1961, the Program broadened its activities to include support of two new activities: (a) field demonstrations and (b) research development projects. Field demonstrations are defined as the demonstration and evaluation of basic research findings in a natural educational setting. Such a definition implies that demonstrations (a) will be derived from the results of previous research, (b) will develop and/or illustrate new educational programs or procedures, and (c) will include an empirical evaluation of the effectiveness and feasibility of such programs or procedures.

During fiscal year 1961, due to limitation of funds, demonstration proposals were invited only in the areas of mathematics and education of the mentally retarded and of the talented. In this first year of operation, six demonstration projects were funded by the Cooperative Research Program. Although funds are still limited for this activity, investigators interested in support for demonstration projects may now submit proposals in any area related to education. Instructions for such applications may be obtained by writing to the Cooperative Research Program.

Three related but distinct types of research development activities have also been undertaken by the Program in fiscal year 1961. One is the *individual research development project* for the ordering and synthesizing of research. In this activity an investigator with a small staff is expected to develop a critical review of the research literature in a given area of education, to examine the strengths and weaknesses

of approaches to research in the area, and to suggest possible new approaches to the problems involved. A second type of research development activity is the *research conference*. The purpose of such conferences is to bring together persons engaged in research on the same or closely related problem areas in order to permit them to share knowledge and techniques and to stimulate thinking about new approaches to the problem. The *research seminar* is the third type of developmental activity established in fiscal year 1961. Research seminars are designed to allow researchers to spend 2 to 4 weeks in a mutual examination of a designated area of education. During the seminar, the participants discuss major research completed and in progress in the area under consideration to determine which research problems should be given high priority and to generate actual research approaches to existing problems.

During fiscal year 1961 three individual research development activities were supported, two dealing with creativity and one with educational administration. A conference involving guidance and a seminar concerning mental retardation were approved and negotiated into contracts. Additional research development activities will be invited by the Program as funds become available.

As an extramural research branch of the Office of Education, the Cooperative Research Program receives proposals for basic and applied research projects, research development activities, and field demonstrations from colleges, universities, and State education agencies. After careful staff review, each proposal is assigned to one of six areas of research interest: (1) Administration and Personnel; (2) Characteristics of Learners and Test Construction; (3) Curriculum and Instruction; (4) Guidance and Learning Theory; (5) Sociology of Education; and (6) Special Education. The grouping of the project descriptions in this publication corresponds to these six areas of research interest.

After further review by the research coordinator responsible for the area to which the proposal has been assigned, each proposal is sent out for review by Office of Education specialists concerned with the subject matter with which the proposal deals. A study concerning language development programs utilizing a sample of high school students, for example, would be sent to a specialist in the Language Development Section for review. The specialist's comments are attached to the copies of the proposal. The proposals are then ready for review by the Research Advisory Committee of the Cooperative Research Program.

Public Law 531 specifies that the Commissioner of Education must obtain the advice and recommendations of educational research specialists competent to evaluate the proposals as to the soundness of the

research design, the possibilities of securing productive results, the adequacy of resources to conduct the proposed project, and the relationship of the project to educational research already completed or in progress. A Research Advisory Committee was therefore established for the Cooperative Research Program to advise the commissioner on those proposals which are most worthy of support. Membership on the committee is by invitation of the Commissioner of Education; each of the nine members serves a 3-year term. Members are selected from among outstanding educators, educational research specialists, and behavioral and social scientists who have demonstrated competence and knowledge in research related to education. The members of the committee are:¹

ERIC F. GARDNER, chairman, professor of education, Syracuse University

DONALD D. DURRELL, professor of education, Boston University

WARREN G. FINDLEY, professor of educational psychology, University of Georgia

EVERETT C. HUGHES, professor of sociology, Brandeis University

JAMES L. JARRETT, president, Western Washington College of Education

DAVID R. KRATHWOHL, professor and research coordinator, Michigan State University

JULIAN C. STANLEY, Jr., professor of education, University of Wisconsin

LLOYD TRUMP, associate secretary, National Association of Secondary School Principals, National Education Association

DOROTHY A. WOOD, chairman, department of psychology, University of North Carolina

The Committee reviews and evaluates each proposal in terms of four general criteria: (a) the significance of the problem to education; (b) the adequacy of the research design; (c) the personnel and facilities available at the institution to conduct the research; and (d) the economic efficiency of the project, or whether the probable results seem to justify the cost. The proposals rated highest on these criteria are recommended to the Commissioner for approval. Once the Commissioner has approved the projects, staff members of the Cooperative Research Program negotiate contracts with the appropriate university, college, or State department of education.

By the end of fiscal year 1961 the Cooperative Research Program had received 1,483 applications from colleges, universities, and State education agencies and had supported 423 projects of various types since 1956.

During fiscal year 1961, 354 applications for basic and applied research projects and 39 applications for demonstration projects were received. Of these, 90 research projects and 7 demonstration projects

¹ Donald Durrell, James Jarrett, Julian Stanley, and Dorothy Wood joined the committee in fiscal year 1962. They replaced John Fischer, Harry Levin, Henry Otto, and Dewey Stult.

*Proposals reviewed and approved for support by Cooperative Research Program,
fiscal years 1957-61*

Fiscal year	Proposals reviewed			Proposals approved	
	Total	Basic and applied	Demonstration	Number	Percent
Total.....	1,483	1,443	39	423	29
1957.....	312	316	0	108	34
1958.....	173	173	0	50	29
1959.....	279	279	0	86	31
1960.....	321	321	0	82	26
1961.....	303	354	39	97	24

were approved by the Commissioner. The above table, which presents the number of proposals reviewed by the Research Advisory Committee and the number and the percentage approved in each fiscal year, indicates that the number of proposals submitted has shown a gradual increase each year and the rate of approval has remained approximately the same from year to year.

To date, the Program has supported projects in 127 universities and colleges and in 17 State departments of education in 43 states, the District of Columbia, Guam, and Puerto Rico. These projects deal with a wide range of problems at all levels of education and are conducted by individuals in various disciplines. In addition to educational researchers, specialists from psychology, sociology, anthropology, political science, economics, history, statistics, English, mathematics, philosophy, and other fields have participated in Cooperative Research projects.

As the Program has grown in size and scope, the Congress has recognized its continuing importance by raising annual appropriations. Including the \$5 million appropriated for fiscal year 1962, the total appropriations for all types of research under the Cooperative Research Program have been approximately \$17.6 million. The following list shows appropriations for cooperative research from 1957 to 1962.

Fiscal year	Appropriations (millions of dollars)
1957.....	\$1.1
1958.....	2.2
1959.....	2.7
1960.....	3.2
1961.....	3.4
1962.....	5.0
Total.....	\$17.6

Including the funds required to complete the approved projects in subsequent years, the Federal investment in research under the Cooperative Research Program exceeds \$23 million. The average Federal Government contribution to each project has been approximately \$50,000, although the cost of individual projects ranges from less than \$1,000 to more than \$1 million. Colleges, universities, and State education departments have contributed over \$12 million to these projects.

Dissemination of the results of the projects is accomplished in several ways. Summaries of final reports are available upon request from the Cooperative Research Program after the completion of the final report. Final reports are distributed throughout the Nation by the Library of Congress Documents Expediting Project to the university and public libraries which subscribe to this service. Other libraries may obtain a copy of the report on interlibrary loan from a repository library. Microfilms of final reports are available after completion of the project from the Library of Congress at approximately \$2.25. Specific cost information may be obtained from the Cooperative Research Program.

In addition to final reports, summaries, and microfilms, the Office of Education publishes monographs of selected Cooperative Research projects. Single copies of the monographs are available without charge while the supply lasts from the Publications Distribution Unit, U.S. Office of Education, Washington 25, D.C., and multiple copies are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

RESEARCH ON:

I. ADMINISTRATION AND PERSONNEL

The Influence of Different Types of Public Institutions of Higher Learning on College Attendance of Students From Varying Socioeconomic and Ability Levels

Problem.—This study proposes to discover the influence that different types of public institutions of higher education have, in the communities in which they are situated, on the college attendance of young people with varying levels of ability and from diverse socioeconomic backgrounds.

Objectives.—(1) To discover how representatively different types of public institutions draw from the various socioeconomic and ability levels of graduates from high schools in the same community as the colleges, (2) to discover how representatively different types of public colleges draw from the various socioeconomic levels of the general population in the community, and (3) to discover what effect the presence of different types of public institutions of higher learning appears to have in determining the percentage of various subgroups of high school graduates who enter any type of college.

Procedures.—The sample will consist of 6,000 high school seniors from 12 communities of moderate size in which only one public institution of higher learning exists. Among the types of colleges which should be involved are (1) local public junior colleges; (2) State-controlled junior colleges; (3) 2-year extension centers of State universities; and (4) urban universities. The students who entered each college as freshmen in September 1959, who came from the immediate community of location, and who were graduated from high school in June 1959, will compose the group to be studied. These freshmen will be compared with the preceding June high school graduates in the same community. In addition, the academic records of each socioeconomic subgroup in the freshmen class will be compared; the ability factor will be held constant. An analysis will be made of

existing plans, devices, and problems pertaining to articulation between 2- and 4-year colleges as well as those practices within 4-year institutions which affect transfer students.

T. R. McCONNELL, professor of education and chairman of the Center for the Study of Higher Education, University of California, Berkeley.	Project 1133. Duration: 2 years, 5 months. Feb. 1961 to June 1963. Federal contribution: \$112,473.
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Modifying the Self-Concept of Certain Prospective Teachers

Problem.—This study is both an outgrowth of a previous study and an integral part of a continuing one. In project 352, "Characteristics of Teacher Behavior Related to Children's Achievement in Several Elementary Grades," three teacher personality types were identified: the turbulent teacher, the self-controlling teacher, and the fearful teacher. Of the three types, the fearful teacher was found to be least effective with all student personality types. The continuing study, of which the current one is a part, will attempt to build a more positive self-concept in the fearful teacher through a revised teacher education curriculum.

Objective.—To develop educational experiences which promise to be effective in building a more positive self-concept in fearful prospective elementary teachers.

Procedures.—The literature regarding the effectiveness of experiences designed to change basic attitudes and feelings will be reviewed. Case studies will be made of approximately 25 to 30 students who are identified as fearful through the Manifold Interest Schedule. The purpose of these case studies will be to delineate the problems of such students. Experiences will be developed for strengthening self-concepts, and these will be incorporated in the conventional curriculum. A group of students with inadequate self-concepts will be identified for enrollment in the experimental program. If a revised curriculum can be developed, the study will continue with the initiation and evaluation of such a program.

LOUIS M. HEIL, director, Office of Testing and Research, Brooklyn College, Brooklyn, N.Y.	Project 1153. Duration: 1 year. Feb. 1961 to Jan. 1962. Federal contribution: \$17,056.
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Multivariate Statistical Procedures in Predicting Teacher-Pupil Classroom Behavior

Problem.—To use data obtained from attitude and personality inventories to predict teacher effectiveness.

Major objectives.—(1) To identify the common elements present in a battery of attitude and personality inventories and the classroom behavior which they predict, (2) to apply two approaches to the problem of combining criterion measures into a composite, and (3) to compare differences in the descriptions of teacher effectiveness which result.

Procedures.—The 51 elementary teachers from the Nashville and Davidson County Tennessee public schools who participated in an earlier project (469) will constitute one sample for this study. A cross-validation sample will consist of approximately 90 elementary school teachers from North Carolina or South Carolina city school systems. The data will be collected from four paper and pencil inventories and four scores related to teacher-pupil classroom behavior. The Teacher Opinion Inventory will be used to appraise the attitudes that teachers exhibit toward teaching. The Minnesota Teacher Attitude Inventory and the Minnesota Multiphasic Personality Inventory will provide measures of the teachers' attitudes toward their pupils and their personal adjustment. The Survey of Educational Leadership Practices places the attitudes of teachers along a continuum from authoritarian to democratic leadership. The Observation Schedule and Record will be used to measure the emotional climate of the classroom, the verbal emphasis by the teacher (the extent to which the teacher uses traditional teaching methods), and the social structure of the classroom (the extent to which the classroom is organized in autonomous small groups). The Russell Sage Social Relations Test rates the ability of school children to plan and carry out a cooperative group problem-solving task. A factor analysis of predictor and criterion measures will be carried out and the criterion measures will be combined into a composite. Multiple regression and canonical correlation techniques will be used to predict the composite. Items will be selected that maximally predict the optimal criterion. Finally, the optimal prediction equations, the factor analysis, and the selected items will be cross validated with the second sample of teachers.

ROBERT S. SOAR, associate professor of education, University of South Carolina, Columbia.

Project 1170
Duration: 1 year.
Jan. 1961 to Dec. 1961.
Federal contribution: \$17,236.

Problem-Solving Proficiency Among Elementary School Teachers

Problem.—To assess and predict the level of proficiency and changes in proficiency of beginning elementary teachers in solving problems in the teaching of reading and arithmetic.

Objectives.—(1) To assess changes in the problem-solving proficiency of beginning elementary teachers that occur during the first 2 years of teaching, and (2) to identify the relationships that exist between problem-solving proficiency and a number of teacher and school-system characteristics.

Procedures.—Teachers beginning to teach in the fall of 1961 and 1962 in 16 school systems will be assessed in problem-solving proficiency in the teaching of reading and arithmetic. The assessment will be repeated in the spring of 1963. The Mathematics Teaching Tasks, Intermediate Grades, and the Reading Problems Test for Teachers Grades 1-6 developed under project 419 will be used in this assessment. In addition, each teacher will be asked to complete the Teacher Characteristics Schedule, and data will be gathered on the school system variables by interview. The various relationships will be determined by correlational analysis and by analysis of variance.

RICHARD L. TURNER, assistant professor of education, Indiana University, Bloomington.

Project 1262.

Duration: 3 years.

July 1961 to June 1964.

Federal contribution: \$47,471.

Interaction Between Wealth and Expenditures for Education in Selected States

Problem.—This study investigates the interaction that occurs between wealth and expenditures for education in selected States.

Objectives.—(1) To study trends in educational expenditures in relation to increases in wealth, population changes, changes in tax structure, and changes in intergovernmental fiscal relationships, (2) to explore the effects of education on economic growth, and (3) to ascertain differences in school support patterns among fiscally dependent and independent school districts.

Procedures.—The data already available from a previous study (803) of five States will be combined with data to be collected from seven other States to test for interactions between expenditures for education and other selected variables, using the following operational hypotheses: (1) Expenditures for education in a given year are related to income in that year. (2) Increases in educational expenditures

from some year in the past to 1960 are related to increases in per capita income from that year to 1960. (3) Income at present is related to the amount and proportion of total educational expenditures devoted to the different educational levels at a given year in the past. (4) Increases in expenditure for education will be accelerated during time intervals when shifts are made from property taxes to sales and/or income taxes as sources of revenue. (5) Increases in expenditures for education will be related to changes in the form of financial support for schools in this sequence: laissez-faire, mandation, equalization, stimulation. Data on expenditures, income, and organizational structure will be gathered from the 12 States for the period from 1935 to 1960.

A stratified random sample of approximately a thousand cities will be drawn by the U.S. Bureau of the Census. This will be divided into lists of cities with fiscally dependent and independent school districts. Then all school districts which are matched on type of city, average daily attendance, wealth, and revenue from outside the district will be compared for differences in expenditures per pupil. An analysis of the pairs will also be made to describe the interactions in the two classes of districts between revenue allocations for support of schools and support of local government services.

H. THOMAS JAMES, associate professor of education, Stanford University, Stanford, Calif.	Project 1241. Duration: 18 months. June 1961 to Nov. 1962. Federal contribution: \$55,343.
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The High-Speed Computer as a Research and Operations Device in School Law

Problem.—To investigate the use of high-speed computers in the storage and retrieval of information related to school legal problems.

Objectives.—(1) To place on magnetic tape all pertinent legislation, litigation, and opinions relating to Pennsylvania schools, and (2) to devise and test a series of retrieval programs involving a wide sampling of school legal problems.

Procedure.—The texts of selected legal materials will be transcribed on magnetic tape in a form which can be used by the computer. The texts to be used are (1) all Pennsylvania education statutes, (2) the rules and regulations of the Pennsylvania Department of Public Instruction, (3) the Pennsylvania Attorney General's opinions regarding education, (4) some miscellaneous Pennsylvania statutes pertinent to education but not included above. Once the materials are on tape, experiments will be conducted in retrieving information related to selected legal problems, such as: (1) Under what

circumstances is a teacher liable for pupil injuries sustained on field trips? (2) What degree of intemperance must be established before the dismissal of a tenure teacher? (3) Under what conditions may a board of school directors permit the attendance of nonresident pupils in the public schools?

J. WILLIAM ASHER, associate professor of education, and ROBERT W. BRITTELL, associate dean and professor of education, University of Pittsburgh, Pittsburgh, Pa., and NEAL V. MUSMANNO, deputy superintendent of public instruction, Pennsylvania Department of Public Instruction, Harrisburg, Pa.

Project 1275.
Duration: 1 year.
July 1961 to June 1962.
Federal contribution: \$27,425.

Long-Term Study of the Educational Effectiveness of Newly Formed Centralized School Districts in Rural Areas—Part Two

Problem.—To determine whether or not the type of school district organization in rural communities is related to the effectiveness of the school.

Objective.—To compare the provision of educational opportunities, the achievement of educational objectives, the cost of providing the opportunities and attaining the objectives, and the changes in community and neighborhood social structure and processes in reorganized and nonreorganized rural school districts.

Procedures.—The sample consists of the same 10 Wisconsin communities—5 reorganized and 5 nonreorganized—used in project 375. The provision of educational opportunities in reorganized and nonreorganized districts will be determined by the level of training of the teacher; availability of teachers in such special subjects as art, music, and physical education; availability of minimum library facilities; availability of audiovisual equipment; the amount of time the teacher spends with the individual child each day; the teacher's age, sex, educational qualifications, experience, and salary; opportunities for inservice training; characteristics and amount of supervision available; and qualifications of administrators. These data will be gathered by interview, questionnaire, observation, and review of school reports. Differences in educational achievement will be measured by achievement test scores in reading, arithmetic, English, social studies, and science; level of intelligence; rating on interest inventories; and rating on social and personal behavior inventories for the 12th-grade students. The cost of providing the opportunities and attaining the objectives will be obtained from financial records of the

districts. Finally, the changes produced in community and neighborhood social structure and processes will be assessed by socioeconomic status scores of the families in the study, socioeconomic service patterns of families in the study, and the amount of service provided by the village center to the farm service area.

BURTON W. KREITLOW, professor of education and agricultural and extension education, University of Wisconsin, Madison.	Project 1318. Duration: 3 years. Aug. 1961 to July 1964. Federal contribution: \$60,243.
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Optimal Scheduling in Educational Institutions

Problem.—To explore the use of electronic computers for developing schedules for academic institutions.

Objectives.—To develop a scheduling system for students, faculty, and facilities which will have a widespread application in universities, colleges, and high schools.

Procedures.—Mathematical models will be developed to adhere to the criteria and logic inherent in the generation of time schedules for educational institutions. An assignment algorithm will be formulated to consider the many factors that have a bearing on the effectiveness of criteria to evaluate schedules. A digital computer will be used to simulate the effectiveness of student scheduling, facilities planning, faculty utilization, and other criteria applicable to scheduling evaluation. Finally, a unified system of scheduling will be developed and translated into a universal-language, digital computer program which will be structured to facilitate its use in individual institutions.

W. R. TURKES, associate dean, Schools of Engineering and Mines, and chairman, industrial engineer department, and ALBERT G. HOLZMAN, associate chairman, and professor of industrial engineering, University of Pittsburgh, Pittsburgh, Pa.	Project 1323. Duration: 2 years. Sept. 1961 to Aug. 1963. Federal contribution: \$64,768.
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Role Expectations and Perceptions of School Principals

Problem.—To define a research design and to develop instruments for obtaining data concerning the role expectations and perceptions of school principals.

Objective.—(1) To discover disparities between the expectations and perceptions attributed to persons and groups and the actual expectations and perceptions of these persons and groups; and (2) to

determine whether the verbalized perceptions and expectations of principals and others remain consistent over a period of time.

Procedures.—The sample for this study will consist of the elementary, junior high, and senior high school principals, the superintendents, and a random sample of teachers in selected school systems in Oklahoma. During this first year of what is conceived of as a long-range project, an examination will be made of conceptual frameworks and of previous research and workshop findings. Further, an intensive study will be made, using opinionnaire and interviewing instruments, to discover significant patterns of relationships among (a) habitual cognitive constructs of school principals, (b) the expectations and perceptions that school principals and the occupants of related positions hold regarding the role of the principal and the roles of the occupants of other positions, (c) attributed expectations and perceptions regarding the role of the principal, and (d) the morale and value orientations of school principals and other professional school employees. The instruments will be administered twice to obtain a measure of consistency.

ROBERT E. SWEITZER, associate professor
of education, Oklahoma State University
of Agriculture and Applied
Science, Stillwater.

Project 1329.
Duration: 12 months.
Sept. 1961 to Aug. 1962.
Federal contribution: \$41,835.

Legal Problems in the Administration of Education by Educational and Noneducational Government Agencies

Problem.—To investigate the extent and nature of the administrative controls of educational activities exercised by noneducational agencies of government and the legal relationships between these governmental agencies and the educational authorities whose chief responsibility is to operate schools.

Objectives.—(1) To investigate the relationships between educational agencies and noneducational agencies of government having authority to administer aspects of the total educational enterprise at State and local levels, (2) to investigate the scope of noneducational agencies of government to approve, modify, veto, or otherwise restrain action of educational agencies, and (3) to describe the effects of any of these actions upon actual school operation where these can be identified.

Procedures.—This research includes four phases which will be carried on concurrently. One phase is the identification of agencies of State and local government from legal sources and from legal sections of State departments of education in each of the 50 States. Another is the collection and analysis of legal and other related data bearing

on the problem. A third phase includes interviewing of officials in nongovernmental agencies, State departments of education, or representative school systems, to clarify uncertainties or confirm conclusions. A fourth phase is the consultation of knowledgeable persons in the area of the study, such as school attorneys, law professors, or professors of educational administration.

LLOYD McCANN, professor of education,
University of Arizona, Tucson.

Project 1359.
Duration: 2 years.
Sept. 1961 to Aug. 1963.
Federal contribution: \$37,636.

Effect of School Building Environment on Personnel Interactions and Attitudes

Problem.—To utilize data obtained in a previous project (918) to explore the effect of school building environment on personnel interactions and attitudes.

Objective.—To determine the relationships between (1) ecological factors and patterns of interaction when factors of enclosure are controlled, (2) patterns of interaction and attitude factors when factors of ecology are controlled, (3) attitude factors and type of enclosures when factors of interaction are controlled, and (4) factors of enclosure and student ecology when factors of attitude are controlled.

Procedures.—The data from the inventories of the 32,000 high school students who were a part of project 918 will be tabulated and key-punched for machine summarization. From this data base, students will be distributed into a 128-cell matrix containing dichotomized factors of sex, grade level, years in school, socioeconomic index, and IQ. Within this matrix, both frequency of interaction and foci of interaction variables will be examined. Chi-square and analysis of variance formulae will be applied as appropriate. The second step will be to distribute the students into high-low groups according to frequency of interaction and to examine the resulting 256-cell matrix for attitude factors (attitudes toward classroom and building, toward self and peers, toward the social environment of the school). Finally, students will be distributed into four self-other acceptance groups with ecological factors and frequency of interaction controlled and the resulting 1024-cell matrix will be examined for types of building enclosures represented (compact *vs.* campus type and subject-matter organization *vs.* school-within-school organization).

KARL T. HEREFORD, associate professor,
administrative and educational services,
College of Education, Michigan
State University, East Lansing.

Project 1443.
Duration: 6 months, 1 week.
June 1961 to Dec. 1961.
Federal contribution: \$10,120.

RESEARCH ON:

II. CHARACTERISTICS OF LEARNERS

The Effects of Group Counseling on School Adjustment of Under-achieving Junior High School Boys Who Demonstrate Acting-Out Behavior

Problem.—This study is an integral part of a long-range project designed to investigate the application of group counseling to under-achieving pupils who possess varying levels of learning potential and behavioral characteristics.

Objectives.—(1) To demonstrate the effect of group counseling on underachieving junior high school boys who demonstrate acting-out behavior, (2) to determine teachers' attitudes toward this type of student and change in teacher attitudes as a result of discussion groups and counseling sessions.

Procedures.—The sample will be taken from three schools in similar socioeconomic areas. It will include about 96 pupils who have demonstrated acting-out behavior according to teacher observations and who have an Accomplishment Quotient of less than the mean quotient for the boys in the sample. They will be divided into two experimental and two control groups at each school. Both counseling groups and the teacher discussion groups will be conducted by the same counselors; however, a different counselor will be responsible for each school. Appropriate evaluative devices will be administered to students before and after counseling. In addition, the teachers' attitudes will be evaluated by several instruments before the teacher discussion groups begin and after the last sessions are concluded. Appropriate statistical techniques will be used for analyzing the data.

C. C. DUNSMOOR and BENJAMIN COHN,	Project D-040.
Board of Cooperative Educational	Duration: 2 years.
Services, Westchester County, N.Y.	October 1961 to October 1963.
Dept. of Ed., Albany.	Federal contribution: \$68,050.

A Study of Statistical Models for the Evaluation and Interpretation of Educational Criteria

Problem.—(1) To construct a model for the analysis of contingency tables, (2) to determine which of various ordering principles in Step-

Down-Analysis is most appropriate for the qualitative interpretation of statistical results, and (3) to develop statistical tests to interpret the results.

Objectives.—(1) To study models suitable for the analysis of qualitative data available in the form of multidimensional contingency tables; (2) to develop statistical methods of analysis, especially for the study of associations among traits; (3) to study various methods of ordering criterion variables or combinations of criterion variables; (4) to develop statistical methods designed to facilitate interpretation of results based upon such order of criterion variables; (5) to study models designed for the analysis of subject-test interactions; (6) to develop statistical methods for the identification of such models and for the testing of appropriate hypotheses connected with these models; (7) to present all proposed statistical methods in such a form that research workers with no more than basic training in statistics can use them; (8) to develop such computational and electronic machine programs as may be desirable to facilitate analysis of studies of this type; (9) to apply such methods to the analysis of educational experiment data now available to us; and (10) to suggest further application of results to educational research studies now in progress.

Procedures.—In the first of three phases, general concepts of partial correlation and partial association will be studied, especially with a view to finding parameters which can be used to generalize the concept of classification of dependence patterns. Procedures will then be developed to identify factors by this method, and will be compared with procedures of "latent class analysis" currently used for this purpose. Hypotheses will be stated, and tests will be developed.

In the second phase, the present status of the Step-Down-Analysis technique will be summarized and translated into an operational method suitable for the research worker. The final phase of the research program calls for a comparison of models designed by other researchers for subject-test interactions. The pattern of variance-covariance or correlational matrices resulting from each assumption regarding the nature of subject-test interactions will be presented, and statistical tests will be constructed to study the plausibility of each pattern of this kind, and to distinguish between different patterns. Statistical methods will be developed for the identification of models designed for the analysis of subject-test interactions and all methods translated into operational procedures.

BOYD HARSHBARGER, director, Statistical Laboratory, Virginia Polytechnic Institute, Blackburg.

Project 1132.

Duration: 3 years.

Jan. 1961 to Dec. 1963.

Federal contribution: \$66,425.

*A Theory-Oriented Investigation of Nonintelligence Factors
Associated With Scholastic Achievement*

Problem.—To investigate the problem of underachievement among college students of superior potential.

Objectives.—To investigate, in a systematic manner, the question of why some university students fail to perform at a level consistent with their measured potential. The research, which will be conducted within the framework of a set of theoretical formulations, postulates behavior to be a function of needs, goals, and expectancies. The specific objectives are (1) to obtain descriptive information which is relevant to the framework adopted and will distinguish bright under-achievers from bright normal achievers, (2) to revise the theoretical framework in light of the results obtained in investigating the first objective, and (3) to extend the investigation to include considerations of antecedent conclusions of underachievement.

Procedures.—The experimental bright underachiever sample will consist of all students in the College of Arts and Sciences of the University of Colorado at the sophomore, junior, and senior levels whose academic aptitude test score places them at the 80th percentile or above and whose grade point average is below 2.00. For a control group, a bright normal achiever sample will consist of all sophomores, juniors, and seniors in the College of Arts and Sciences with grade-point averages of 3.00 or greater, equated with the underachiever sample with respect to academic aptitude test scores. These groups will number about 150 students each. During the second year of the study the samples will be expanded to cover other schools and colleges of the University of Colorado.

Both sample groups will be given a battery of goal preference and expectation inventories and a questionnaire concerning vocational choices. Additionally, a random subsample of both samples will be interviewed to determine differences between experimental and control groups in general attitudes, philosophy, and other personal characteristics. Measures of central tendency and frequencies of responses relevant to the hypotheses will be computed.

GLENN TERRELL, associate professor of	Project 1139.
psychology, University of Colorado,	Duration: 3 years.
Boulder.	Jan. 1961 to Dec. 1963.
	Federal contribution: \$35,482.

*Factors Related to Attrition of Graduate Students at the
Doctoral Level*

Problem.—To discover some of the possible factors responsible for attrition among doctoral students.

Objective.—To determine some of the possible economic, psychological, and sociological factors responsible for students dropping out at different stages in doctoral programs, especially those who drop out after completing all of the requirements except the dissertation; and to determine the extent to which some of these factors may vary for students in different academic disciplines.

Procedures.—Arrangements will be made with 25 representative post-master graduate schools of the Nation to obtain names and addresses of all students who were enrolled in post-master or doctoral programs in the traditional arts and sciences, between September 1948 and June 1952. Graduate schools will be selected to take into account the number of doctorates produced in the traditional arts and science fields, so that a comparative analysis can account for the differences in the academic fields as well as differences among universities.

The questionnaire that will be sent to these individuals will be designed to obtain information which might contribute to an understanding of possible differences between successful doctoral candidates and those who drop out before completing the requirements. Respondents to the questionnaires will be classified by academic area and by categories indicating the stage of completion toward the doctorate. General survey techniques will be used in the gathering of data.

ALLAN TUCKER, assistant dean, Graduate School, Michigan State University, East Lansing.

Project 1146.

Duration: 2 years.

July 1961 to July 1963.

Federal contribution: \$52,435.

Evaluation of Infant and Preschool Mental Tests

Problem.—To evaluate the status of mental tests for infants and preschool children.

Objectives.—(1) To examine the suitability of currently used infant and preschool mental tests for present clinical and school diagnostic purposes, (2) to evaluate the content of these tests by item analysis and by clinical opinion as to their applicability for present-day purposes, and (3) to obtain suggestions from personnel in various types of clinics and research centers as to the modifications and new approaches needed with mental tests at this level.

Procedures.—The literature will be thoroughly explored to establish a body of information about existing tests. A questionnaire will be sent to clinics, child development centers, experimental schools, and

foundations where infants and preschool children are being tested. This questionnaire will be designed to elicit information on the mental tests that are of special value, the purposes for which such tests are used, the limitations of the tests, and the availability of test protocols. Available test protocols will be analyzed for their item content and item intercorrelations will be computed. Factor analyses of the correlation matrices will be made.

LELAND H. STOTT, leader, longitudinal research program, and RACHEL STUTSMAN BALL research consultant, Merrill-Palmer Institute, Detroit, Mich.	Project 1166. Duration: 1 year, 6 months. July 1961 to Dec. 1962. Federal contribution: \$23,840.
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Personality Traits Related to "Stress Tolerance" as Determinants of Academic Achievement

Problem.—This study explores the personality traits represented in acquiescence response set and the Psychasthenia Scale of the Minnesota Multiphasic Personality Inventory (MMPI) as determinants of academic achievement.

Objective.—To determine the relationship between academic achievement and the personality variables represented in the acquiescence response set and the Psychasthenia Scale of the MMPI.

Procedures.—The sample consists of 380 male undergraduate freshmen at Johns Hopkins University. The antecedent variables are represented by scores from the Scholastic Aptitude Test of the College Entrance Board Examination, academic rank in high school senior class, Psychasthenia Scale scores, and two measures of the acquiescence response set. The criterion variable is grade-point average at the end of the first year of college. Separate statistical analyses will be made for arts and sciences students and engineering students, for public school students and private school students, and for students living in the dormitory and students living at home. Within the arts and sciences subanalyses will be made for the humanities, the social sciences, the biological sciences, and the physical sciences. For each of these classifications, correlations will be made between the antecedent variables and the criterion variable, and the intercorrelations between the antecedent variables will be computed.

James L. Kuethe, assistant professor of education and psychology, Johns Hopkins University, Baltimore, Md.	Project 1218. Duration: 3½ months. July 1961 to Oct. 1961. Federal contribution: \$3,322.
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Motive and Trait Correlates of Pupil Schema

Problem.—To examine the relationships among student expectations of the leadership behavior of teachers, student needs, and student personality traits.

Objectives.—To determine a number of interrelationships among the achievement, power, and affiliation needs of students, their traits as expressed in sociometric nominations, and their perceptions of teacher leadership behavior.

Procedures.—All the data necessary for this study were collected in a previous study (project 798). The sample consists of 428 elementary, junior high, and senior high school pupils in a suburban community. Data of needs for achievement, affiliation, and power were obtained from a modified group TAT. Traits of influence, achievement, and acceptability were measured by pupil nominations. Pupil expectations for leadership behavior of teachers were obtained from an adaptation of the LBDQ. A series of intercorrelations among the variables will be computed and tested for significant departures from zero.

LOUIS M. SMITH, associate professor,	Project 1226.
and THOMAS JOHNSON, instructor,	Duration: 10 months.
Graduate Institute of Education,	September 1961 to June 1962.
Washington University, St. Louis, Mo.	Federal contribution: \$4,456.

Sampling Distribution of Error Factors in Multidimensional Scaling

Problem.—To determine the sampling distribution of error factors in multidimensional scaling.

Objective.—To generate the sampling distributions necessary for discriminating between error and nonerror multidimensional scaling factors.

Procedures.—The error factors will be generated from random-number input data. Different output statistics, such as the ratio of first error factor to sum of factors, the ratio of first error factor to second error factor, and the ratio of differences between first and second and second and third error factors, will be examined for useful sampling distributions. Statistics for 50 to 100 samples will be accumulated for each sampling distribution. The distributions will be compared to existing important sampling distributions. The initial activity is planned to simulate the judgments of 15 objects by 35

judges according to a multidimensional ranking procedure. The number of judges will be varied, perhaps to 10 and to 100. The number of objects will be varied independently, perhaps to 8 and to 30.

ROBERT EARL STAKE, assistant professor, Department of Educational Psychol- ogy and Measurements, University of Nebraska, Lincoln.	Project 1253. Duration: 1 year. July 1961 to June 1962. Federal contribution: \$11,362.
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*Administering a Listening Comprehension Test Through Use of
Teacher-Readers, Sound Film, and Tape Recordings*

Problem.—To compare the results achieved in listening tests administered by various methods.

Objective.—To examine the relative effectiveness of listening tests when given by (1) teachers who have not had supervised practice in the test administration, (2) teachers who have had supervised practice, (3) tape recordings, and (4) sound motion pictures. The reliabilities and mean scores of the four methods will be compared.

Procedures.—The sample for this study will consist of 4,500 students in 180 classes in grades 4 through 12. The classes will be randomly divided into the four groups described under the objectives. The Listening Comprehension Tests of the Sequential Tests of Educational Progress will be used for this experiment. In these tests, the student has to answer questions about a series of passages read to him. These selections represent typical listening situations which he may encounter in school. They include directions, explanations, stories, arguments, poems, and so forth, from which the student must select the important facts and think critically about them in order to answer questions. In preparation for the experiment, a 35-minute sound motion picture narrated by a professional announcer will be made for each of the three levels. In order to standardize the comparison between tape recording and film, the original recording of the sound track for the film will be dubbed to magnetic tape. By so doing, the audio portion of the test will be an exact duplicate in timing and vocal expression. Analysis of variance will be used in the analysis of the data.

QUENTIN C. STODOLA, director of coun- selling and testing, North Dakota State University of Agriculture and Applied Science, Fargo.	Project 1266. Duration: 8 months. July 1961 to Mar. 1962. Federal contribution: \$13,262.
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An Information Service of Educational Research Materials

Problem.—To investigate the establishment of an information service of educational research materials.

Objective.—To develop and put into operation an information retrieval system that will permit the detailed analysis of educational research material and selective dissemination based on individual interests.

Procedures.—A sample of 4,000 documents will be used, approximately half of which will be related to the field of educational media. The other half will represent the range of interest and complexity of subject matter, and of the format of documents in the educational research field. An investigation of alternative approaches to the analysis of subject matter in the documents selected will result in the development of (1) a format and procedures for the preparation of conventional abstracts, (2) a format and procedures for the preparation of stylized abstracts (ready for encoding for machine searching and correlation), and/or (3) a policy for indexing or classifying materials. An analysis of the terminology that is representative of the field will serve as a basis for a coding system for a machine searching operation and a reexamination of existing classification systems and of subject authority lists. Finally, a pilot retrieval system will be developed and tested by obtaining a sample of questions representative of questions that might be asked by potential users.

ALLEN KENT, associate director, Center
for Documentation and Communication
Research, School of Library Science,
Western Reserve University,
Cleveland, Ohio

Project 1298.
Duration: 1 year.
Apr. 1961 to Apr. 1962.
Federal contribution: \$15,511.

Empirical Determination of Sampling Distributions of Item Discrimination Indices and the Hoyt Reliability Coefficient

Problem.—To compute the empirical sampling distributions using samples of different sizes for the several item discrimination indices and the Hoyt analysis of variance internal consistency reliability coefficient.

Objectives.—The following questions will be answered: (1) What is the nature of the sampling distribution of the selected indices? (2) Do the sampling distributions of item discrimination indices computed using internal and external criterion scores differ? If so, in what

manner? (3) How well do the empirical results agree with the theoretical? (4) What known sampling distributions best represent the empirical findings?

Procedures.—A sample of 750 cases whose scores on 80 items of the Q-scale of the ACE psychological examination will serve as the parent population. Their scores will serve as the internal criterion and the freshman grade point averages earned by these same persons will serve as the external criterion for the item analyses. The item response choices of this population will be punched into cards to serve as a master deck. From the population will be drawn, with replacement, random samples of the following sizes: (a) 100 samples of 15 cases each, (b) 200 samples of 30 cases each, (c) 200 samples of 60 cases each, and (d) 100 samples of 120 cases each. Representative items having various combinations of item difficulty and discrimination will be selected for analysis rather than all items of the test.

Upon completion of the computer analysis, empirical frequency distributions of each index will be tabulated. The chi-square test of goodness of fit will be used to test the conformity of the empirical and hypothesized theoretical distributions. In addition, the first 4 moments of these distributions will be compared for all indices.

FRANK B. BAKER, assistant professor,
University of Wisconsin, Madison.

Project 1299.
Duration: 1 year.
Oct. 1961 to Sept. 1962.
Federal contribution: \$20,884.

Polygraphic Arousal Patterns Related to Attention and Learning in Groups

Problem.—To examine certain aspects of the interaction of the leader and members of a group in learning and attention processes.

Objective.—To determine the relationship between certain characteristics of psycho-physical arousal patterns of the leader and members of a group and certain characteristics of attention and learning.

Procedures.—Five graduate and 25 undergraduate students will be divided into 5 groups; the graduate students will serve as leaders. In the first of a series of experiments, 5 group leaders will be prepared to present any of 5 lectures developed for them. After each lecture a multiple-choice test will be given and a group discussion will be conducted on the topic. Throughout the sessions, psychophysical measurements (cardiac, respiratory, psychogalvanic response) obtained through a polygraph will be recorded for the leader and for

each member of the group. The figures recorded will be analyzed to determine the arousal patterns exhibited. Additional experiments will be devised on the basis of data obtained from the first experiment.

ERNEST G. BEIER, associate professor of psychology, University of Utah, Salt Lake City.

Project 1308.

Duration: 1 year, 3 months.

Sept. 1961 to Nov. 1962.

Federal contribution: \$14,260.

Cognitive Originality, Physiognomic Sensitivity, and Defensiveness in Children

Problem.—This research is concerned with the relationships which exist among cognitive originality, physiognomic sensitivity, and defensiveness in children.

Objectives.—(1) To explore the relationship between cognitive originality and physiognomic sensitivity in children, and (2) to determine to what extent both of these are inhibited by the presence of defensiveness.

Procedures.—About 300 fifth-grade children from public schools in the Boston area will serve as a sample for this study. The measures of cognitive originality will include the identification of unusual uses of common objects, the specification of similarities, the provision of plot titles, and the detection of potential problems. These measures will be adapted from some which Guilford has developed. Tasks concerning originality of fable endings and ability to provide associative mediating links will be adapted from Getzels and Jackson and from Mednick, respectively. Physiognomic sensitivity will be measured by a number of tasks designed to elicit verbal responses to line patterns, stick figures, and other visual materials. In two of these tasks the categories of response will be left completely open. Another will require the matching of line patterns with facial expressions, and a fourth will require the description of line patterns in terms of adjectives. One of the free-response procedures will concern non-objective line patterns while the other will use stick figures. A further procedure in the physiognomic area will concern stimulus triads that may be paired in a manner that exhibits greater or lesser sensitivity to physiognomic properties. There will be three kinds of procedures for assessing defensiveness: self-descriptive questionnaire scales; indices of degree of discrepancy between sorts of self-referent statements by the child and by judges in terms of degree of relevance to the child; and content analysis of story completions for evidence of denial.

Selected scales from the WISC will be administered for control purposes.

MICHAEL A. WALLACH, assistant professor of psychology, Department of Economics and Social Science, Massachusetts Institute of Technology, Cambridge.	Project 1316. Duration: 3 years. Aug. 1961 to July 1964. Federal contribution: \$71,623.
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Item Analysis, Test Design, and Classification

Problem.—To develop new techniques for item analysis and test design.

Objective.—To develop new statistical concepts by which items in a test and tests in a battery can be evaluated.

Procedures.—The index of minimum mean-squared-error or other indexes will be examined to determine whether or not they might be used instead of the indexes of reliability and validity in the multivariate normal model. The nonparametric model in which the item response is dichotomous and the criteria are dichotomous will also be examined. Finally, studies will be conducted on several of the distribution problems in classification statistics, which uses test responses to classify an individual or predict his position on some continuum.

HERBERT SOLOMON, professor of statistics and education, executive head, Department of Statistics, Stanford University, Stanford, Calif.	Project 1327. Duration: 3 years. Sept. 1961 to Aug. 1964. Federal contribution: \$133,745.
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Relationships Between the Characteristics and Backgrounds of High School Graduates and Their Subsequent Personal and Educational Development

Problem.—To examine the relationships between the characteristics and backgrounds of high school graduates and their subsequent personal and educational development.

Objective.—To compare the personal and educational development of students who enter college full time immediately after high school with the development of those who do not.

Procedures.—A sample of over 2,000 high school graduates who did not enter college immediately after graduation and over 2,000 graduates who did will be selected from a previously studied sample (project 348). Data have been assembled on the social, economic, cultural, and educational background of each graduate as well as on

his high school performance, his personality characteristics, his academic aptitude, and the values he held with respect to college, vocational success, and other factors. Also assembled are data about the pursuits of all graduates in the fall of 1959 and the performance of those who entered college on a full-time basis that autumn. This project will extend the study of these graduates to 4 years beyond graduation from high school. Information on the performance and retention of high school graduates will be obtained from the colleges which they enter. Through the cooperation of the high schools, a random sample of the graduates who did not immediately enter college as full-time students will be followed up at intervals to obtain information concerning their formal educational experiences on either a part-time or full-time basis. In addition to obtaining information on the further education of the graduates, efforts will be made to measure changes occurring in them over the 4-year period following high school graduation. Modified forms of the questionnaires and personality inventories given to the group near the point of high school graduation will be given again approximately 4 years later as a means of determining changes in aspirations, attitudes, and cultural interests. A random sample of both groups will also be interviewed, as an additional means of ascertaining change and obtaining students' value judgments about their further educational experiences.

T. R. McCONNELL and LELAND L. MED-	Project 1328.
SKER, professors of education, Center	Duration: 2 years, 9 months.
for the Study of Higher Education,	Oct. 1961 to June 1964.
University of California, Berkeley.	Federal contribution: \$220,024.

Structure of Intellect Abilities in Algebraic Thinking

Problem.—To investigate the structure of intellect abilities necessary to algebraic thinking.

Objectives.—(1) To identify the intellectual factors necessary for successful algebraic thinking, (2) to discover whether the factor structure for algebraic ability differs from that of ninth-grade general mathematics, (3) to discover whether the appropriate structure of intellect tests will serve as predictors of success in ninth-grade algebra.

Procedures.—Structure of intellect tests will be administered to 500 ninth-grade students in algebra and general mathematics courses. Criterion tests covering the usual content of these courses will be given at the end of the fall semester and the spring semester. Factor analyses will be made to compare the factor structure of boys with that of girls, and the structure of algebra students with that of gen-

eral mathematics students. Composite factor scores will be derived and used in a multiple-regression procedure to predict course grades and scores on criterion tests. Profiles of students especially able in algebra will be investigated.

J. P. GUILFORD, professor of psychology, Department of Psychology, University of Southern California, Los Angeles.	Project 1342. Duration: 2 years. Aug. 1961 to Aug. 1963. Federal contribution: \$40,547.
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Dynamics of Personality Development in the College Years

Problem.—To investigate the dynamics of personality development during the college years.

Objectives.—(1) To identify, through intensive longitudinal studies of college students, patterns of "development" and "underdevelopment," (2) to determine the variables that influence the amount and kind of change that occurs, (3) to establish criteria for evaluating the extent to which potential for growth is realized in individual cases, and (4) to infer laws relating education practices and events to developmental processes.

Procedures.—On the basis of 3,000 freshman scores on the Omnibus Personality Inventory (OPI), two main groups of students, one initially high and one low in level of personality development, will be selected for intensive interviewing throughout their 4 years at college. An additional low-scoring group of *experimental* subjects will be selected, and attempts will be made to stimulate personality growth by special, individually planned educational techniques. By the senior year, each of the three groups will comprise about 40 students. Interviews will be carried out with persons in the subject's environment. The interviewers will visit classes to obtain information on the characteristics of the academic environment. Where students in the class under study have availed themselves of psychotherapeutic help at the student health service (approximately 15 percent are expected to do so), information about such transactions will be incorporated into the study. Data from the intensively studied subjects will be supplemented by (a) data from matched groups of subjects who are interviewed only once toward the end of their college career and (b) data from the OPI which will be administered to the entire class in the freshman year and again in the senior year.

SAXTON POPE, director, Department of Psychiatry, and Nevitt Sanford, professor of psychology, University of California, Berkeley.	Project 1355. Duration: 5 years. Aug. 1961 to July 1966. Federal contribution: \$184,762.
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*Program Development for Longitudinal and Cross-Sectional
Research in Shaping Intellectually Linked Motives*

Problem.—To the extent that motivational theory and research in psychology have been used in education, the use has primarily involved motivation as an independent variable. It is felt that motives and attitudes should also be used as dependent variables. Whether one is to consider motives as means or ends in education, it is necessary systematically and critically to evaluate the application of theories of motivational acquisition and modification in educational settings. The schools are in many ways ideal for both naturalistic and "laboratory" studies in motivation. Therefore, through careful planning, it is possible to do research which can contribute jointly to the basic research literature on motivation and the literature on educational practices involved in the shaping of motives.

Objectives.—These research efforts are directed toward the development of a program of research which will have as its primary objective a comparative evaluation of extant theories of motivational modification. Specifically, this study will be concerned with the development of such motives as intellectual curiosity and a desire to respond to the problematic or unknown aspects of the environment.

Procedures.—The procedures will involve review of the literature on theory in the light of recent findings by the investigator, extensive discussion, and a few carefully defined experiments and pilot studies. There will be a continuing weekly 4-hour seminar, limited to the four or five people directly involved in the project, plus consultants.

RICHARD ALPERT, assistant professor and director of Training Program in Child Development, Department of Social Relations, Harvard University, Cambridge, Mass.	Project 1373. Duration: 1 year. Feb. 1962 to Jan. 1963. Federal contribution: \$20,776.
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*General Relations of Changes of Interest and Personality to
Changes of School Performance in Normal Children*

Problem.—To investigate the relationship between changes in interests and certain personality traits of eighth- and ninth-grade children and changes in school attainment levels.

Objectives.—(1) To determine what are the normal and abnormal degrees of annual fluctuations of interest, achievement, and personality measures of the typical school child, and (2) to describe the relationship between the increments and declines in school achievement and

(a) initial levels of ability, personality, and interests, and (b) concurrent changes in interests, personality and a few major features of environment.

Procedures.—A sample of 270 subjects who were initially tested as eighth and ninth graders in project 701 will be tested again as tenth and eleventh graders. A second group of 200 students in grades 10 and 11 will be tested in the winter of 1961-62 and again 18 months later to cross-validate internal relationships on a new sample. The data will be gathered with the Thurstone Primary Abilities Test, the Culture Fair Intelligence Test, the Child Personality Questionnaire, a battery tentatively designated as the School Motivational Analysis Test, the Iowa Achievement Tests, and an objective measure of the home environment. An analysis will be made within one period of the covariation of changes occurring in the various areas of measurement. A second analysis between the two periods will sequentially relate changes in one period to changes in the next.

RAYMOND B. CATTELL, research professor in psychology, Laboratory of Personality Assessment, University of Illinois, Urbana.

Project 1411.
Duration: 3 years.
Sept. 1961 to Aug. 1964.
Federal contribution: \$65,919.

RESEARCH ON:

III. CURRICULUM AND INSTRUCTION

A Modern Mathematics Program as It Pertains to the Interrelationship of Mathematical Content, Teaching Methods, and Classroom Atmosphere

Problem.—For the past 5 years, the Syracuse University Madison Project has been engaged in developing and testing various new curriculum materials in mathematics, for use in grades 2 to 10. This demonstration project seeks to evaluate these curriculum materials.

Objectives.—(1) To build a functioning "modern" mathematics program in a number of schools so as to attempt to solve relevant problems in curriculum, pedagogy, and school organization; and (2) to record as much relevant data as possible during the process of implementation.

Procedures.—The new curriculum materials will be tested in about 13 schools with about 20 classes. Project personnel in the participating schools will teach demonstration classes, observe and assist the regular teachers in the conduct of classes, conduct seminars on content material, record classroom lessons for subsequent group discussion, and work with principals and supervisors. Wherever possible, various local people in each school system will assume responsibility for additional supervision and for close collaboration with project personnel. An extensive program of data collection and interpretation that may include Q-sort techniques, tape recordings, written tests, and other devices for studying the effect on teacher attitudes, teacher behavior, teaching of related subjects, student achievement, student attitudes, etc., will be used to evaluate the project. In addition, a short interdisciplinary conference of 8 or 10 participants will be held to complete the final specifications for the evaluative instruments.

ROBERT B. DAVIS, associate professor of mathematics and education, Syracuse University, Syracuse, N.Y.

Project D-022.

Duration: 1 year, 1 month.

Sept. 1961 to Nov. 1962.

Federal contribution: \$51,012.

*Visual and Auditory Efficiency and Its Relationship to Reading
in Children*

Problem.—To determine the relation between ability to alternate modalities, differences in efficiency in modalities, and their relations to each other and to reading achievement.

Objective.—To find out whether ability to alternate from one modality to another efficiently has any relation to reading achievement, a relation suggested by prior research. Subsidiary interests center about age changes in this ability to alternate and the generality of this skill across different learning, memory, and perceptual tasks and materials.

Procedure and Design.—The population will consist of approximately 300 children divided among the first, third, and fifth grades. Each subject will be given tests to measure modality preference and efficiency, watchkeeping, and bimodal reaction time; most of the tests have been devised for this specific purpose by the Institute. Learning and modality preference measures will be constructed for this purpose, also a complete reading test evaluation, and a brief, nonverbal measure of intelligence. Other measures will be used as well—an experiential-demographic scale, a questionnaire to teachers, and a scanning test to measure the child's visual reading pattern. These measures are for analyses subsidiary to the major purpose of the study. The major analyses will be concerned with the relation of the various measures of modality efficiency and preference to (a) one another, (b) reading achievement, and (c) age.

MARTIN DEUTSCH, associate professor,
codirector Institute for Developmental
Studies, and ALFRED M. FREEDMAN,
chairman, Department of Psychiatry,
New York Medical College,
New York.

Project 1099.
Duration: 2 years, 6 months.
Apr. 1961 to Sept. 1963.
Federal contribution: \$84,031.

Language Ability in Grades 7, 8, and 9

Problem.—This study traces the development of language ability in the same group of subjects through 3 years of junior high school, grades 7, 8, and 9.

Objectives.—The basic hypothesis to be tested is that learning equips the individual with broad patterns of response rather than one-to-one relationships. More specifically, the following hypotheses will

be tested: (1) Subjects who develop skill in the spoken language, using pitch, juncture, and stress effectively for purposes of communication, will develop the skills of writing, reading, and listening more quickly than those who do not develop the same degree of skill in the spoken language; (2) subjects with the highest degree of ability in speech and writing will use a more varied and flexible pattern of syntax than subjects with less ability; (3) there will not be a uniform development of all four areas of the language arts even though there will be a tendency for overall development to follow the gains of each individual subject; (4) those subjects who manifest the highest skill in language ability will also be those who use relational words (e.g. *moreover, although, because, inasmuch as*, etc.) more often and more accurately than the other subjects; (5) those subjects with the highest ratings on school attendance will also be those who rank highest on development of skill in language; (6) those subjects who have the most interaction with other persons will develop the skills of language more rapidly than those whose contacts with other persons are more limited; (7) subjects who have high socioeconomic status will develop language power more rapidly and to a greater competency than subjects who have low socioeconomic status; and (8) subjects with high ability in language will express such matters as tentativeness and supposition more frequently—their language will reflect flexibility rather than rigidity of thinking and reacting.

Procedures.—The sample for this longitudinal study will consist of 230 seventh-grade students who will be followed through grades 8 and 9. The data gathered will include transcripts of the subjects' speech, writing, reading, and listening effectiveness, along with health, mental ability, socioeconomic status, school achievement, and school attendance. The transcripts will be gathered in identical situations for all subjects; speech will be recorded on audiographs and tape recorders, typed by specially trained typists, and analyzed according to codes developed in an earlier study. Analyses will include amount of language, coherence, hypotaxis (subordination), errors in usage, style of speech, control of writing, amount and quality of reading, ability to handle arithmetic symbols, health in relation to language, functions of language used by children, and other pertinent data.

WALTER LOBAN, associate professor of education and supervisor of the teaching of English, University of California, Berkeley.

Project 1131.

Duration: 3 years.

Jan. 1961 to Dec. 1963.

Federal contribution: \$47,939.

A Study of the Effectiveness of Beginning the Teaching of Reading in Kindergarten

Problem.—The main focus is upon an experimental comparison of the effectiveness of beginning the teaching of reading in kindergarten with beginning such teaching in the first grade.

Objectives.—To test the following hypotheses concerning the experimental groups: (1) They will show significantly greater achievement in reading at the end of grade 1 than will the control groups; (2) They will have significantly greater reading rates, reading vocabularies, and reading comprehension at grade 3 and grade 5 than will the control groups; (3) They, as well as the control groups, will show no significant differences in the number of pupils who evidence reading disabilities at grade 3 and grade 5; (4) They will make significantly greater gains than will the control groups in achievement in certain academic subjects at the end of grade 3 and grade 5; (5) They will evidence greater interest and enjoyment in reading at the end of grade 1, grade 3, and grade 5, as measured by the quantity of reading, than will the control groups; and (6) They will be superior to the other groups on the criterion variables mentioned above.

Procedures.—The research design proposes to teach certain beginning reading activities to 50 experimental and 50 control groups totaling 3,000 kindergarten pupils. Although both groups will receive similar instructions, the experimental groups will be taught reading in kindergarten and control groups will be taught in the first grades, so that the time of beginning reading instruction will be the main variable. The method of teaching beginning reading in kindergarten and first grade uses the context and the sound of the first letter and as many others as are needed. In the first and following grades both the control and experimental groups will be subdivided into two programs. One of these will be an adjusted program designed to take the pupils as far and as fast in reading as they can soundly go. This will allow for division into four groups: an experimental group with a regular reading program in grade 1; one experimental group with an adjusted reading program in grade 1; one control group which begins a regular reading program in grade 1; and one control group with an experimental reading program beginning in grade 1 followed by an adjusted reading program. To determine the long-range effects of the study, pupils will be tested at the end of grades 1, 3, and 5. A variety of reading tests will be used and a questionnaire dealing with occupation, education, and similar matters will be administered to parents. The principal sta-

tistical technique will be analysis of variance with time of beginning reading as the primary variable.

KENNETH E. OBERHOLTZER, superintendent, Denver Public Schools, State Dept. of Ed., Denver.	Project 1134. Duration: 5 years. Jan. 1961 to Dec. 1965. Federal contribution: \$92,319.
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Prediction and Modification of Human Talent in Senior High Schools

Problem.—To determine the extent that cognitive variables, measures of personality and motivation, school pressures, and sociometric appraisals by the age mates obtained in junior and early senior high school years explain and predict academic achievement and other talent in later secondary years.

Objectives.—To develop prediction equations for certain talents which will be stable over a number of years for different populations; to develop new measures of motivation.

Procedures.—Data are available over the 3 junior high school years for approximately 1,500 students from 4 Texas communities. For special studies of results of modifying educational processes, some experimental groups of 24 to 30 males and females will be drawn from each subject-matter area in one community with a comparable single experimental group retested in a second community. Necessary control groups for this study will be drawn from two of the communities. An original battery of approximately 100 tests has been reduced to less than 15 "factor variables" by combining measures through factor analytic and regression studies of the intercorrelations of the original 100 scales. The factor variables are to be used as the predictors over all high school years, with academic achievement and other talents and attributes as criterion measures. The variables developed in junior high school as well as other measures to be developed from data gathered during the early high school years are to be related to choice of subjects, responses to different kinds of teaching, high school drop-outs, college attendance and survival by multiple-regression, factor analytic, and variance techniques.

CARSON MCGUIRE, professor of educational psychology, University of Texas, Austin.	Project 1138. Duration: 3 years, 3 months. July 1961 to Sept. 1964. Federal contribution: \$150,000.
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Group Aspirations and Group Coping Behavior

Problem.—To determine the origins of group goals and the manner in which groups cope with an awareness that they have not achieved their goals.

Objectives.—To test the validity of the following assumptions: (1) A group sets a goal in accordance with the dynamics involved in setting a level of aspiration. (2) A group, when selecting a goal, may develop a tendency toward optimism (or pessimism) which leads it to select a more difficult (or easy) goal than previous performance would ordinarily cause it to choose, (3) Feelings of failure among the members of a group are a function of the discrepancy between actual performance and the group's goal, (4) Groups adopt coping behavior intended to remove feelings of failure and to prevent them in the future.

Procedures.—In the earlier phases of the study, groups of two and three eleventh- and twelfth-grade students of both sexes will be placed in laboratory situations where discussions in group situations can be observed. Later, groups will be increased to six members as observation techniques are developed and refined. In all experiments the same tasks will be used so that results may be cumulative over the several phases and so that comparisons of the effects of different conditions can be readily made. Each person will understand that his contribution is necessary for goal achievement by the group. In general, two methods of data collection will be used—standardized observations and postexperimental questionnaires. Observation of the group's performance on the task and the selection of a level of aspiration require no special devices. Observation of such matters as interpersonal influence attempts, overt tendencies toward optimism or pessimism, or the use of coping behavior, will require specially prepared observation instruments. Postexperimental questionnaires will be used to measure private beliefs and attitudes such as personal goals, feelings of failure, or coping behavior. Standard methods of statistical analysis will be used in the reduction of the data and in testing for significance of results. Punched cards and tabulating machinery will be used in treating the data for all phases of the project.

ALVIN ZANDER, professor of educational psychology; director, Research Center for Group Dynamics, University of Michigan, Ann Arbor.

Project 1143.
Duration: 3 years.
Dec. 1960 to Nov. 1963.
Federal contribution: \$87,774.

*Pupil-Teacher Adjustment and Mutual Adaptation in Creating
Classroom Learning Environment*

Problem.—To undertake a comparative analysis of the patterns of cooperation or alienation between pupils and teachers and the resultant learning outlines of different productivity.

Objectives.—(1) To identify children of different "lifespace" types in the same classroom who adopt different adjustment patterns in assuming their roles as pupils, (2) to demonstrate ways in which these types of children interact to form peer cultures which are supportive or disruptive of teaching efforts, (3) to identify teachers of different lifespace types who adopt different postures toward the teaching role and differential patterns toward different learner types in their classrooms, and (4) to identify different patterns of mutual adaptation, integration, and alienation between teachers and learners in different classrooms.

Procedures.—The sample of teachers and students for this study will be drawn from seven school systems in the Ann Arbor, Mich., area which includes rural, industrial, suburban, and university communities. Data have already been collected from 30 classrooms with a student population of 772. An additional 30 classrooms with essentially the same teachers and a comparable number of pupils will be added. The grades range 4 to 12 with from 12 to 34 pupils in each class. The pupils represent a wide sampling of intelligence, achievement, and socioeconomic levels. Teacher questionnaires, a structured teacher interview, pupil questionnaires, and a structured pupil group interview will be used to gather the data. In the questionnaires each teacher will be asked to assess the pupils in several different ways, to designate optimal mental health and learning practices and conditions, and to indicate his own characteristics. The interviews will elicit information about attitudes toward teaching and their perceptions of salient forces in their lives. The pupil questionnaires will gather information on their perceptions of other pupils, their families, their teachers, and themselves. The pupil-group interviews will be used to study the reactions of pupils of different intellectual and achievement levels to the total classroom situation.

RONALD LIPPITT, professor of psychology and sociology, University of Michigan, Ann Arbor.

Project 1167.

Duration: 2 years, 6 months.

Jan. 1961 to June 1963.

Federal contribution: \$59,780.

*Evaluation of the Madison Project Method of Teaching in
Arithmetic Situations, Grades 4, 5, and 6*

Problem.—This project seeks to evaluate the effectiveness of the Madison Project method of teaching arithmetic—the development of a readiness for higher mathematics and a keener insight into fundamental arithmetic through early experience in solving algebraic problems.

Objective.—This study will compare the arithmetical achievement, algebraic aptitude, interest in mathematics, and abstract thinking ability of students taught by the Madison Project method with that of students taught by a more conventional method.

Procedures.—Twelve experimental classes of fourth-, fifth-, and sixth-grade students taught by the Madison Project method will be compared with 12 control classes of the same grades taught by the common method as practiced in the Syracuse Public Schools. The two treatments will be evaluated for one school year. The hours of instruction received by the control and experimental subjects will be approximately equal. Attempts will be made to equalize classroom environmental situations for the experimental and control classes.

From those teachers who volunteer to participate in the research project, a number with similar qualifications will be selected and assigned at random to the experimental and control classes. Inservice training will be provided in equal amounts to both groups.

The sample of 720 students will also be assigned at random to the control and experimental classes. Consideration will be given to grouping the students according to ability before being assigned.

Instruments measuring arithmetical achievement, algebraic aptitude, interest in mathematics, and abstract thinking will be administered at the beginning and the end of the school year. Differences will be computed between the scores on pre- and post-testing of each instrument used. The significance of the difference in change between each experimental group and its corresponding control group will be tested by an appropriate technique—analysis of variance or analysis of covariance.

WILLIAM F. BOWIN, supervisor, mathematics, Syracuse Public Schools, N.Y.
State Department of Education, Albany.

Project 1193.
Duration: 1 year, 6 months.
July 1961 to Jan. 1963.
Federal contribution: \$28,409.

Study of Reinforcements in Classroom Learning

Problem.—To obtain information concerning the nature and effectiveness of learning reinforcements operating in the classroom.

Objectives.—To answer questions such as the following: Does the reinforcement of one pupil also serve as a reinforcement to others? How effective is silence as a reinforcer? Are different reinforcers effective for different types of students?

Procedures.—A study of what appear to be classroom reinforcements will be made through a review of the technical literature. Once the review has been completed, laboratory situations will be developed in which the increase in response strength resulting from the operation of particular classes of reinforcers can be assessed. For example, two subjects will be placed in a learning situation in which one subject is reinforced for learning one aspect of a task and the other subject is reinforced for learning another aspect. The subjects might be told that later they will be asked to perform the entire task. Such a situation simulates classroom conditions in which pupils attempt to perform tasks although they have not been directly reinforced for performing all the component skills of the tasks.

ROBERT M. W. TRAVERS, professor and
chairman of educational psychology,
University of Utah, Salt Lake City.

Project 1196.
Duration: 3 years, 1 month.
Sept. 1961 to Sept. 1964.
Federal contribution: \$50,425.

Relationships Between Teacher Characteristics and Student Behavior

Problem.—To investigate relationships between teacher characteristics, such as authoritarianism, warmth, academic emphasis, achievement, affiliation, recognition, and control needs, and student achievement, creativity, and attitudes toward learning.

Objectives.—To answer specific questions such as the following: Does a high degree of teacher control stifle creativity? Will students react differently to a teacher who exhibits much control over students as a result of high-achievement need than to one who has a need for control *per se*? Will there be substantial agreement between student perception of teacher characteristics and observer ratings of classroom behavior?

Procedures.—From 40 to 100 teachers of grades 1 to 5 will constitute the sample for this study. Data already collected on these teachers in a previous project (No. 444) are available in the form of (a) ratings made after extensive classroom observation by two observers, (b) an extensive sample of verbal behavior in the classroom, (c) expressed attitudes toward educational practices, philosophy, etc., (d) a questionnaire measure of behavior preferences, (e) a projective measure of needs. The first task of this study will be to adapt and

develop devices for measuring student behavior. Among those that will probably be used are (a) achievement gains, (b) observation of student behavior in the classroom, (c) a questionnaire measure of students' reactions to the teachers, (d) measures of creativity and/or problem-solving ability, and (e) a measure of pupil need. Correlation and factor analysis will be used to explore the relationships among the variables and to test the hypotheses which will be developed.

NORMAN E. WALLEN, associate professor, Department of Educational Psychology, University of Utah, Salt Lake City.

Project 1217.
Duration: 2 years.
Sept. 1961 to Aug. 1963.
Federal contribution: \$26,543.

Studies in Guided Learning

Problem.—This study explores the ways in which guidance can be provided in learning to elicit desired responses from the learner.

Objective.—To determine what kind of guidance in learning to give, how much to give, when, and how long to give it.

Procedures.—Four discrete experiments in the area of symbolic learning will be conducted to discover (a) the relationship between guidance and knowledge of results in paired-associate learning, (b) the effect of test schedules upon learning under conditions of guidance, (c) the interacting effects of guidance and anxiety upon learning, and (d) the amount of transfer as a function of the type of guidance in problem solving. Two additional experiments will be carried out in sequential learning to determine the relative effectiveness of (a) prompting and confirmation techniques, and (b) several different guidance procedures in sequential learning.

JOHN OLIVER COOK, associate professor, Department of Psychology, North Carolina State College, Raleigh.

Project 1242.
Duration: 2 years, 2 months.
July 1961 to Aug. 1963.
Federal contribution: \$39,647.

Achievement-Related Motivation and Ability Grouping

Problem.—To investigate the effects of homogeneous ability grouping in junior high school on academic achievement and vocational aspiration in junior high school and high school.

Objectives.—(1) To determine the differential effects of homogeneous grouping on the performance of individuals who differ in motivation to achieve success or to avoid failure, (2) to discover whether homogeneous grouping produces more realistic vocational plans and aspirations in superior students than heterogeneous grouping, and

(3) to continue the development of a self-report measure of the relative strength of motivation to achieve success and motivation to avoid failure.

Procedures.—The sample for this study comprises 420 superior students and 480 other students in grades 6, 9, and 12. Samples from each of the grades will be used for different substudies. Data have been collected from the Ann Arbor High School senior class of 1958. These students were enrolled in the junior high schools before an ability program went into effect. On the basis of achievement test records, students who would and would not have been assigned to special groups, had the ability program been in existence, have been identified for comparison with seniors of 1962 who were and others who were not enrolled in special sections in junior high. Data were also collected from students enrolled in special classes in the ninth grade in 1958 and from a random sample of remaining students. This ninth-grade group is composed of the same students who will be tested as seniors in 1962.

In 1959-60 data were collected in the sixth-grade classes in the two Ann Arbor schools in which ability grouping was used. Prior to the sixth grade, heterogeneous grouping had been in effect. During 1960-61 further data were collected in the sixth grade in these same schools. In one, ability grouping was continued; while in the other, it was discontinued.

With the 12th-grade samples, the National Merit Test and other tests of achievement, the Strong Vocational Interest Inventory, and a special set of questions to test the reality or unreality of vocational aspirations will be administered and the data used to compare various groups of students (e.g., students with high achievement motive and low test anxiety with students of low achievement motive and high test anxiety.) The Need Achievement Measure and the Mandler-Sarason Test Anxiety Questionnaire (TAQ) will be used to measure achievement motive and to test anxiety, respectively.

With the ninth-grade sample, the vocational aspiration measures and motive measures administered in 1958 will be readministered in 1962 to the same subjects, to permit investigation of the stability of motive measures during the period and of change in vocational aspiration.

In these sixth-grade classes of 1960 and 1961, achievement tests, motive measures, and the grade school form of the ARPS were administered to compare the achievement of various subgroups of the homogeneously and heterogeneously grouped classes.

JOHN W. ATKINSON, professor of psychology, and PATRICIA ANN O'CONNOR, research associate, University of Michigan, Ann Arbor.

Project 1283.
Duration: 1 year 6 months.
July 1961 to Dec. 1962.
Federal contribution: \$17,710.

*Dimensions of Children's Social and Psychological Development
Related to School Achievement*

Problem.—The longitudinal development of aspects of social relationships, aggression, cognition, and perception in children as related to their educational performance.

Objectives.—(1) To trace the development of basic perceptual and cognitive abilities in children, their styles of managing hostile impulses, their self-concepts, and the group codes and mores which regulate classroom behavior; and (2) to ascertain the impact of these characteristics on academic achievement.

Procedures.—Samples of preschool, junior kindergarten, first-, third-, fifth-, and seventh-grade children will be obtained from the Ann Arbor area. Data already available on these children include a medical and family history; measurements of height, weight, and grip strength; carpal and dental development; intelligence; aptitudes; interests; academic achievement; and socioeconomic status. Measures of form and position discrimination, memory span, and quantitative concepts will be collected to trace cognitive and perceptual development. The styles of managing aggressive impulses will be identified by collecting data on the teacher's perception of aggressiveness in the child and his perceptions of the child's reactions to specific socialization and control practices. Perceptions of aggressiveness will also be obtained from independent observers, peers, and the child himself. The child's self-concept will be measured by a Q-sort, the "Kids Like Me" test, or a similar technique. Finally, instrumentation developed by William Morse in Cooperative Research Project 753 will be used to collect data on the interpersonal climate of the classroom, the substantive learning activity, the utilization of group processes, and the adaption of the classroom to the developmental level of the children in the class.

WARREN A. KETCHAM, professor of education, psychologist in the University School, University of Michigan, Ann Arbor.

Project 1286.
Duration: 3 years.
Sept. 1961 to Aug. 1964.
Federal contribution: \$95,210.

*Pattern Practice in the Teaching of Standard English to Students
With a Nonstandard Dialect*

Problem.—To evaluate the effectiveness of pattern practice in teaching standard English to students with a nonstandard dialect.

Objectives.—(1) To prepare materials to implement the use of pattern-practice techniques with speakers of nonstandard English; and (2) to determine to what extent pattern practice techniques help nonstandard speakers master standard English.

Procedures.—During the first year a study will be made of the nonstandard speech patterns of freshmen students at Claflin University. As a result of this study, instructional materials will be developed which use tape-recorded drills and role-playing skits to teach standard English to a group of 60 freshmen who speak nonstandard English. In addition to their regular classes, the students will spend 6 hours a week in laboratory drill. The effectiveness of these techniques will be evaluated by pre- and post-tests using standardized measures such as the Sequential Tests of Educational Progress or the New Purdue Placement Test in English. Evaluation will also be made of students' written reports in other courses and their spontaneous conversations in individual interviews.

SAN-SU C. LIN, professor of English, Claflin University, Orangeburg, S.C.	Project 1339. Duration: 2 years, 10 months. Sept. 1961 to June 1964. Federal contribution: \$66,170.
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The Technology of Programed Instruction and Its Impact Upon an Educational System

Problem.—Research on Cooperative Research Project 691, *Investigations of Variations in the Properties of Self-Tutoring Learning Sequences*, by Glaser and Homme, pointed out two major needs in the field of programed learning: (1) the development of new techniques of programing based on research in learning and on the results of practical application; and (2) the study of the impact of programed learning techniques upon teaching, student accomplishment, and curriculum organization. This study attempts to begin meeting these needs.

Objectives.—(1) To develop programed learning techniques on the basis of the applicability of the findings of experimental psychology to programed instructional procedures; and (2) to investigate in a major school system the impact of programed instruction upon the student, the teacher, the curriculum, and the educational structure.

Procedures.—Two separate but related research tasks comprise the work of the project. Task 1 concerns the experimental investigation of variables influencing the effectiveness and efficiency of programed learning. This task will be carried out by a series of

controlled studies in the laboratory and structured classroom settings. Task 2 concerns the study of the impact of programmed instruction upon a school system. The work of this task will be carried out by detailed field observations of actual school operation, teacher performance, and student achievement.

The sample for task 1 will be a complete school system composed of 14 public schools situated in a residential suburb of Pittsburgh and enrolling about 7,300 students. Further experimental samples for special subgroups such as the mentally retarded may be drawn from another school system which has 397 elementary educable retarded children in special class centers. The sample for task 2 will include the students involved in task 1 and the professional staff of 36 of the school systems in task 1.

ROBERT GLASER, director, Programed Learning Laboratory, Department of Psychology, and J. STEELE GOW, JR., director, Coordinated Education Center, University of Pittsburgh, Pittsburgh, Pa.	Project 1343. Duration: 5 years. Sept. 1961 to Sept. 1966. Federal contribution: \$188,111.
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Achievement, Creativity, and Self-Concept Correlates of Teacher-Pupil Transactions in Elementary School Classrooms

Problem.—This study seeks to determine achievement, creativity, and self-concept correlates of teacher-pupil transactions in elementary school classrooms.

Objective.—To determine the relationships between teacher-pupil transactions representing several teacher behavioral syndromes (e.g., integrative, learner-centered, academically-oriented counseling-centered) and pupil creativity, achievement, and self-concepts.

Procedures.—Twenty-one fourth- and sixth-grade teachers have each been observed for 3 full mornings for a total of approximately 8 hours of classroom time. A record of pupil behavior has been made every 15 seconds by a trained observer. Simultaneously, the verbal behavior of each teacher and the children in communication with the teacher has been recorded on magnetic tape and will be analyzed to determine teacher-pupil transactions. Pupil grade level, chronological age of pupil, and socioeconomic status of each child's parents have been obtained and will be combined to obtain an index of initial situational status. Mental age of each pupil has been computed using the School and College Ability Test (SCAT) and will be used as a control

variable. Measures of pupil academic achievement, creative thinking, and self-concept have been obtained and will be used as dependent variables. Correlations of specific patterns of teacher-pupil transactions with selected pupil dependent variables will be obtained and tested for significance.

ROBERT L. SPAULDING, assistant professor of education, University of Illinois, Urbana.

Project 1352.
Duration: 1 year.
Oct. 1961 to Oct. 1962.
Federal contribution: \$14,047.

Individualizing Junior High School Mathematics Instruction

Problem.—To investigate the effectiveness of particular methods and materials for the individualization of mathematics instruction.

Objectives.—(1) To determine whether individualized mathematics instruction results in greater pupil achievement than conventional instruction, and (2) to develop for testing specific hypotheses relating methods and materials to attributes of individual children and characteristics of the subject matter.

Procedure.—The teaching materials for this study will be supplied for each of 1,400 seventh-grade pupils in 50 experimental classes. Each set of materials will contain 25 units of text, practice, and testing materials. The units represent the traditional content of seventh-grade mathematics written so that pupils may proceed largely independently of the teacher in developing skills and understanding. At the beginning of the school year each child in the experimental treatment will have a specific unit assigned to him on the basis of a diagnostic placement test. After completing a unit the pupil will take a self-test and check his own answers. The student will then have his work checked by the teacher and be given one of two equivalent forms of a unit test. Successful completion of this test, a score of 85 percent correct, will enable the pupil to move to the next unit in the series. Unsuccessful attempts will be followed by review and another self-test prior to being given the second test. Pupils may ask for the assistance of the teachers at any time during the class hour, although they will be encouraged to proceed as far as they can on their own. The California Achievement Battery, the California Test of Mental Maturity, observation, and cumulative records will be used to gather the data.

JOSEPH T. SUTTON, associate professor of psychology, Stetson University, DeLand, Fla.

Project 1365.
Duration: 1 year, 6 months.
Sept. 1961 to Feb. 1963.
Federal contribution: \$35,065.

*Variables Differentiating Two Major Systems of Auto-Instructional
Programing*

Problem.—To investigate the merits of the Crowder and Skinner systems of self-instructional programing by determining the contribution of specific components of each system.

Objectives.—(1) To obtain a better understanding of the role and operation of specific variables that differentiate two alternative styles of programing and (2) to attempt to combine the best characteristics of both systems into one or more optimal systems, assessing them in terms of student achievement and economic factors.

Procedures.—In the first phase of the study a series of relatively small-scale experiments will be conducted to assess the importance of specific components of both the Crowder and Skinner systems of programing. These initial experiments will be designed to yield ideas on how best to define variables for additional experiments. For example, in the course of reducing frame length in a Crowder program, a new way of conceiving branching possibilities in a Skinner program is likely to be generated, or in differentiating response functions of practice versus testing in a Skinner program, a better way of introducing constructed responses to control reading within lengthy Crowder frames may be conceived. A second phase of the project will consist of a larger scale field test of the variables indicated as most important in the first phase. The two programs will not be compared directly, but each will be compared with a variant of itself. The same basic subjects (tentatively, elementary algebra or trigonometry) will be used for both programs.

Tests used to measure learning and retention after an interval of weeks will include standard achievement tests supplemented by test items devised on the basis of program content to assure adequately detailed coverage. Questionnaires to assess interest in the subject matter will also be used, and time spent on each segment of a program by each student will be recorded. It is planned to use two sources of subjects; the first will be drawn from high school students at an appropriate grade level, the second from college students who need to make up deficiencies in the subject matter.

ARTHUR A. LUMSDAINE, professor of
education, University of California,
Los Angeles.

Project 1402.
Duration: 3 years, 6 months.
Sept. 1961 to Feb. 1965.
Federal contribution: \$76,583.

*Relationships Between High School Group Structures and the
Development of Orientations Toward Public Affairs*

Problem.—To develop instruments for measuring orientations toward politics and experiences in the affiliative structure of the school.

Objectives.—To develop a questionnaire for classroom, an oral interview schedule for students, and an oral interview schedule for parents. These instruments will be designed to measure a student's interest in public affairs, his tendencies toward moderation, and his orientation to conflict. The instruments will also provide information about school groups to which the student belongs and the various types of group membership.

Procedures.—The questionnaire items will be designed (a) to elicit factual information, (b) to yield perceptions of and attitudes toward politics, and (c) to elicit information on respondent's level of interest in various matters. The oral interview schedules for students will have a high proportion of open-ended items through which the respondent's perceptions of and feelings about conflict, both in his personal experience and in public affairs, can be more fully explored. The interview schedule for the parents will be designed along lines similar to the schedule for the students. After the instruments have been drafted, they will be administered to samples of students who will be interviewed intensively to test the validity of the instruments.

FRANK A. PINNER, director, Bureau of
Social and Political Research, Michi-
gan State University, East Lansing.

Project 1412.
Duration: 10 months.
Sept. 1961 to June 1962.
Federal contribution: \$23,351.

*Classroom Interaction, Pupil Achievement, and Adjustment in Team
Teaching as Compared With the Self-Contained Classroom*

Problem.—To determine effect of multigrade team teaching on classroom interaction, school adjustment, and achievement.

Objectives.—To compare the effect of a multigrade team-teaching organization with the effect of a traditional self-contained classroom organization on classroom interaction, school achievement, and school adjustment.

Procedures.—The population of the sample will include approximately 525 elementary school pupils and 24 teachers in two schools in Madison, Wis. The pupils will be separated grade by grade on a random basis into control and experimental groups. Efforts will be made to counteract possible Hawthorne effects.

For the experimental group the type of instructional approach will be that of a multigrade team-teaching organization; there will be a primary team and an intermediate team. For the control groups, instruction will occur in a self-contained classroom. To measure classroom interaction, three observers will visit the classrooms several times over a period of 2 years. They will use the Communication Model constructed by Newell, Lewis, and Withall, which contains 14 categories of behavior designed to reflect teacher-pupil interactions in a classroom. A summary of the communications patterns observed in the two types of classrooms will be made in the form of frequency-distribution tables for each of the 14 categories. To determine pupil achievement and pupil adjustment the California Achievement Battery and the California Test of Personality, respectively, will be administered to the entire student body of both schools in the fall and spring of each of the 2 years. The significance of the difference of the mean scores of the control and experimental groups will be determined.

PHILIP LAMBERT, associate professor of education and director of the Washington School, University of Wisconsin, Madison.

Project 1391.
Duration: 2 years, 6 months.
Sept. 1961 to Feb. 1964.
Federal contribution: \$40,334.

Oral and Non-Oral Methods of Teaching Reading by an Autoinstructional Device

Problem.—To discover the importance of an oral response in the recognition of words in the teaching of reading.

Objective.—To test the hypothesis that beginners in reading who are taught word-recognition by a method which requires an oral response to a stimulus word will learn both to understand more words and to pronounce more words than those children who must respond appropriately to the stimulus word without saying it aloud.

Procedures.—Two instructional units in word-recognition will be developed and tried out during the fall semester using automated teaching devices. Each of these programs will be designed for a minimum 3-week presentation and will differ only with respect to the approach taken, i.e., oral or non-oral. In the spring, two experimental groups of kindergarten children (about 75 in each group) who are beginners in reading will complete their respective programs using an autoinstructional device.

The sample will be drawn from total school populations and will be representative with respect to socioeconomic backgrounds, sex, and intelligence. The pupils will be given pre- and post-tests measuring

word recognition, vocabulary, and skills of word-recognition. Data will also be collected from teacher observations of reading behavior. Children's reaction to the autoinstructional program will be solicited by the device itself. Appropriate statistical techniques will be used to compare the scores of both groups.

JOHN D. McNEIL, associate professor of education, EVAN R. KEISLAB, pro- fessor of education, University of California, Los Angeles.	Project 1413. Duration: 9 months. Sept. 1961 to May 1962. Federal contribution: \$14,938.
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Preretirement Education for Hourly Rated Workers

Problem.—Despite their proliferation, preretirement education programs are, as yet, an untested education effort. Moreover, materials and methods employed in current programs were based largely on experiences with salaried and white-collar workers rather than with manual or hourly-rated workers.

Objectives.—To develop and test materials and methods and to determine the effects of participation of hourly-rated workers in a group-discussion type preretirement education program. Other objectives are to study results for different occupational categories of hourly-rated workers and for different levels of education, intelligence, and reading comprehension among hourly-rated workers.

Procedures.—The basic material for the program will be a series of subject-matter booklets designed to help discussion leaders plan the content of each session, to orient resource people who take part in the program, and, insofar as group members are able and willing to read them, to stimulate thinking and participation in group discussion. In addition, to stimulate discussion, a handbook of case histories, films, and a set of still pictures will be prepared and tested.

Subjects for this study will be hourly-rated workers 60 years of age and older who are gainfully employed in the same type of industry and who reside in or near the same community. A parent group meeting these criteria will be selected, and general information will be obtained about all the members. Four random samples of 30 individuals each will be selected from the parent group; two of these will constitute the experimental groups and two the control groups.

The 120 subjects will be interviewed and given a series of tests. The two experimental groups will be offered a group-discussion type preretirement education program. Upon completion of the program, the same tests will be readministered to both experimental and control groups, and the comprehensive interview will be repeated. Then the control groups will become experimental groups and offered the

same program. The same staff discussion leader will conduct all programs. Appropriate statistical techniques will be used to analyze the results.

WOODROW W. HUNTER, research associate in the Division of Gerontology and the Institute of Labor and Industrial Relations, University of Michigan, Ann Arbor.	Project 1422. Duration: 2 years. Sept. 1961 to Sept. 1963. Federal contribution: \$75,600.
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Strategies of Learning and Efficiency of Concept Attainment by Individuals and Groups

Problem.—To identify and classify the strategies of individuals and groups of varying size in attaining concepts and to relate the various strategies to efficiency of learning.

Objectives.—(1) To determine whether strategies employed by individuals and groups in attaining concepts are related to the efficiency of attaining the concepts, and (2) to explore the relationships between the strategy employed by an individual or group and the type of material used, the meaningfulness of the material, and the instructions used.

Procedures.—In each successive semester and summer session, from 72 to 150 students will be drawn from the total population enrolled in educational psychology. These subjects will participate in the study as individuals or as members of groups of varying size. When the effects of groups of two and four persons are established, larger groups will be used in order to establish the size at which the mean efficiency of groups is less than the mean efficiency of individuals working alone. In addition to the size of the groups, the type of material in which the concepts are embedded, the type of instructions, and the meaningfulness of the tasks will be systematically manipulated to determine their effects upon the dependent variables—strategies of learning and efficiency of performance. One replication of each experiment with age, sex, and size of the group held constant will be carried out to validate conclusions. Time in seconds to attain each concept will be recorded as the measure of efficiency. Other information to be secured on the students includes age; sex; major field of study; general intellectual ability; values, using the Allport-Vernon-Lindzey Scale; and originality, flexibility, and ideational fluency, using group tests of divergent thinking.

HERBERT J. KLAUSMEIER, professor of education, University of Wisconsin, Madison.	Project 1442. Duration: 3 years. Aug. 1961 to July 1964. Federal contribution: \$54,744.
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RESEARCH ON:

IV. GUIDANCE AND LEARNING THEORY

Educational, Vocational, and Social Performances of Counseled and Uncounseled Youth Ten Years After High School

Problem.—To determine the extent to which the observed post high school effectiveness of an intensive experimental school counseling program has persisted over a 10-year period.

Objectives.—To test the hypothesis that there will be no significant differences in educational, vocational, and social performances between counseled and uncounseled subjects 10 years after high school graduation.

Procedures.—In 1948 all the 870 sophomores in four public high schools were assigned randomly to experimental and control groups. Subjects in the experimental group were given intensive counseling during each of their last 3 years in high school. The controls were not counseled. Followup studies were made of 100 percent of the living members of both the experimental and control groups 6 months, 2½ years, and 5 years after high school graduation. Data were collected on the vocational choices, vocational progress, social development and adjustment, performances on psychological tests, and academic progress. The present study is designed to extend these followup studies to a 10-year period beyond high school. All living subjects will be contacted and asked to complete a questionnaire containing the same items as the schedule used in the 5-year followup study. The investigator anticipates that he will once again be able to obtain the cooperation of 100 percent of the living members of the original sample. Analyses of these data will include simple studies of differences between control and experimental subjects by computing percentages or means and the use of discriminant analysis techniques.

JOHN W. M. ROTHNEY, professor of education, University of Wisconsin, Madison.

Project 1094.
Duration: 2 years.
July 1961 to June 1963.
Federal contribution: \$23,000.

Development and Consistency of Student Images of Occupation

Problem.—Comparative Research Project 562, "College Student Images of a Selected Group of Professions and Occupations," established that liberal arts college undergraduate students hold highly complex and differentiated stereotypes of a series of high-level occupations. The current study is designed to continue the exploration in this area by tracing the development of occupational stereotypes in high school and college students.

Objectives.—The objectives are (1) to determine the images held by various groups of high school students, of high-level occupations (2) to trace the changes that take place in the images of occupations held by students during 4 years of college, and (3) to ascertain the effect of identification with a professional group on the image of the group.

Procedures.—A group of 500 college students in arts and sciences from a midwestern State university and a private college will constitute one of the samples for the study. A second sample will consist of 300 preprofessional undergraduate college students—possibly in education, engineering, and business. A third sample will contain 600 high school students at 3 or more Detroit area schools. The latter sample will be studied with academic and occupational goals controlled. At each of the universities and high schools, equal probability samples of freshmen and seniors will be given the occupations questionnaire in one of several forms. In the vocational college programs, students at the two extremes of the undergraduate program will be studied. In addition to the questionnaire a series of partially structured interviews will be conducted with 5 percent to 10 percent random subsamples of each population in order to compare the interview protocols with the structured questionnaires. Twelve hours of personal and clinical data concerning the Wesleyan University class of 1962 and data from three sets of replies to occupations questionnaires (May 1959, May 1960, and May 1962) will be analyzed to determine the effects of college on the occupational stereotypes and the structure of belief systems. Finally, about 500 subjects from other universities will be used to determine their images of new occupations and the consistency and interaction of stereotypes.

DONALD D. O'DOWD, assistant dean, and
DAVID C. BEARDSLEE, associate professor of psychology, Michigan State University, Oakland.

Project 1150.
Duration: 3 years, 6 months.
Jan. 1961 to June 1964.
Federal contribution: \$57,357.

Career Development Patterns

Problem.—To undertake a study of career development patterns.

Objectives.—(1) To identify major career patterns and antecedent variables which are predictive of given career patterns; (2) to determine whether stages and sequences in patterns of career development differ for boys and girls; and (3) to ascertain the factors upon which career decisions are made.

Procedures.—Data have already been collected on 108 eighth-grade youngsters in five different urban communities through the use of a standardized personal interview. This interview is designed to elicit information on (a) the child's awareness of factors to consider in curriculum and occupational choices; (b) his awareness of his ability and inadequacies in relation to making curriculum and occupational choices; (c) his awareness of interests and values and their relation to occupational choices; and (d) the independence of his choice. The 108 youngsters will be interviewed in the 10th grade, in the 12th grade, and 2 years after completion of high school to determine what curriculum and occupational decisions have been made in the 2 years since the earlier interview, and what factors were taken into consideration in making these decisions. In addition, the pupils will be asked to project themselves into the future and to indicate how their abilities, values, and interests are related to their decisions concerning the future. A number of variables will be identified from school records and related to occupational choices made. Among them are the type of curriculum chosen, IQ, sex, amount of work experience, parents' occupational level, and extent of participation in extracurricular activities.

WARREN D. GRIBBONS, assistant professor of education, Clark University, Worcester, Mass.

Project 1221.

Duration: 5 years, 2 months.

May 1961 to June 1966.

Federal contribution: \$32,701.

Evaluation of Counseling Treatment With Underachieving High School Students

Problem.—To evaluate the effectiveness of four methods of providing counseling treatment to underachieving high school students in grades 10 to 12.

Objectives.—(1) To ascertain the relative effectiveness of different treatment procedures in improving the academic and personal adjustment of underachieving high school students, and (2) to identify those